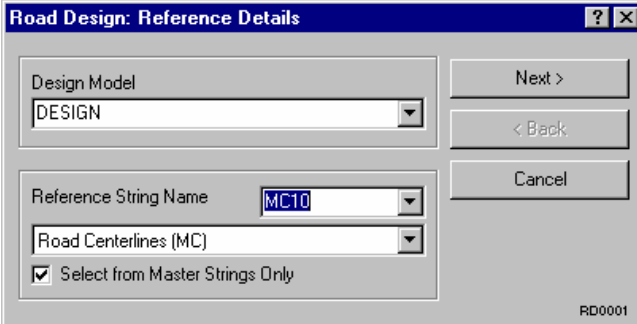# Chapter 7 <u>Create Roadway Template</u>

A variety of methods exist to create the feature strings that define the proposed roadway template. In this chapter, there will be 3 methods illustrated: The MXRoad Method (the wizard), the Input File Method, and Design A String Method.

MX Road Method:

With MXRoad, you can quickly apply previously defined roadway templates to the proposed alignment. There are a few points to consider before continuing, however. If your project will have intersections that need to be designed, or you intend to use rule-based superelevation functions provided in MXRoad, you should wait to apply your shoulder, curb, esplanade, and sidewalk strings until a bit later in the design.

Step 1: Create the Roadway strings from edge of traveled way to edge of traveled way. From the **Design** menu, select **Road Design**, then **Roadways**. You can also simply select the **Road Design Tool** from the MXRoad Toolbar if you are using this. The following panel will appear:
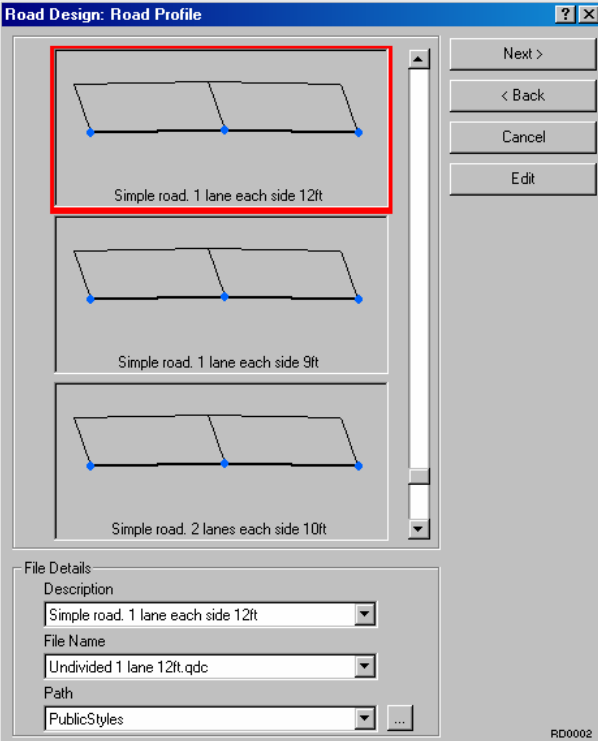

Select the Design Model name and M String Name from the drop down box, or by clicking on them in the Graphics area. Then click **Next.**
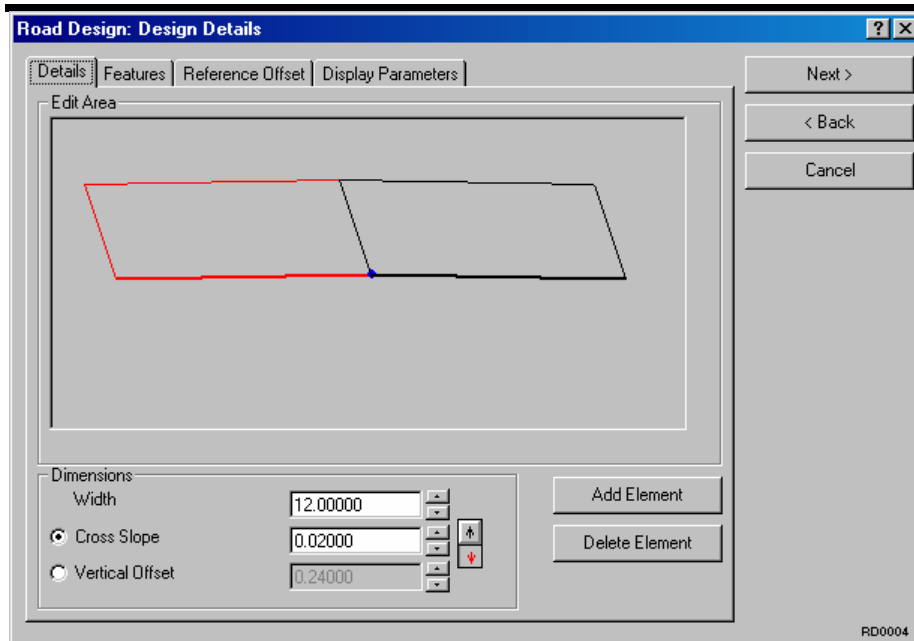
Step 2: The following panel will appear:

This is the panel that allows you to select which template to use. At the bottom of the panel is a Path box where you can select the directory where the template files are kept. Above that is the name of the currently highlighted template image shown in the top part of the panel. A description of the template is also provided.

To view or edit the components of the template, simply select the template and click the EDIT button at the top right part of the screen. The following panel will appear containing the settings that comprise this template:
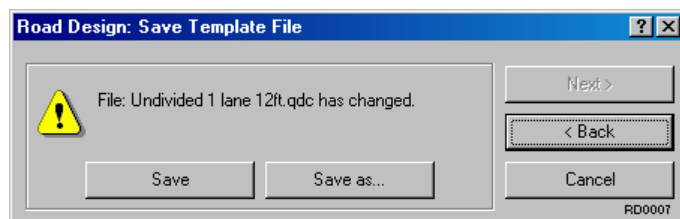
Procedures Manual

Road Design: Design Details

Details | Features | Reference Offset | Display Parameters

Edit Area

Next >

< Back

Cancel

Dimensions
Width 12.00000
⦿ Cross Slope 0.02000
○ Vertical Offset 0.24000

Add Element

Delete Element

RD0004

You can now make a simple alteration to this template, or make a completely new template with additional features such as a center median or multiple lanes by manipulating the various parameters on the tabs on this form.

Click on **Next** to continue after changes have been made.

Step 3: Save the template you've created as either a replacment for the existing one, or a brand-new custom template. If changes have been made you'll be prompted with a panel like this:
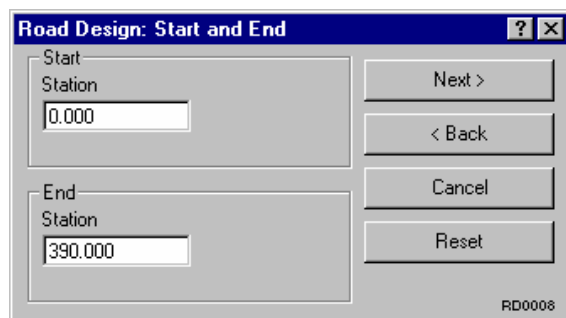
Road Design: Save Template File

⚠ File: Undivided 1 lane 12ft.qdc has changed.

Next >

< Back

Cancel

Save   Save as...

RD0007

Click on **Save As** to create a brand new template file, **Save** to overwrite and existing file, or **Next** to simply continue with the changed settings without changing or creating a file.

Step 4: You'll now be prompted to fill in the station limits which you want to apply the current template to:

The defaults are the beginning and ending stations of the alignment, but you can change these to apply the template to a given portion of the alignment, then click on **Next.**

Road Design: Start and End

Start
Station
0.000

End
Station
390.000

Next >

< Back

Cancel

Reset

RD0008

Step 5. Your template has now been applied to your alignment between the specified stations. A panel will pop up asking you to either click **Next** to create another length of roadway with a different template, **Back** to create another length of roadway with the same template, or **Finish** to exit the Road Design wizard. To apply another template to a portion of the roadway, click on the Create Another Length option then select **Next**. Make sure that if you are using a different template for part of the roadway, that you specify the start station for the new section to be ahead of the end station of the section you just created. In this example, the next template will be applied beginning 50 feet from where the original template left off to the end of the alignment. Be sure that the other template has a different lane width than the first to illustrate the next feature. After applying this second template to the last section of the alignment, you should see the following panel:
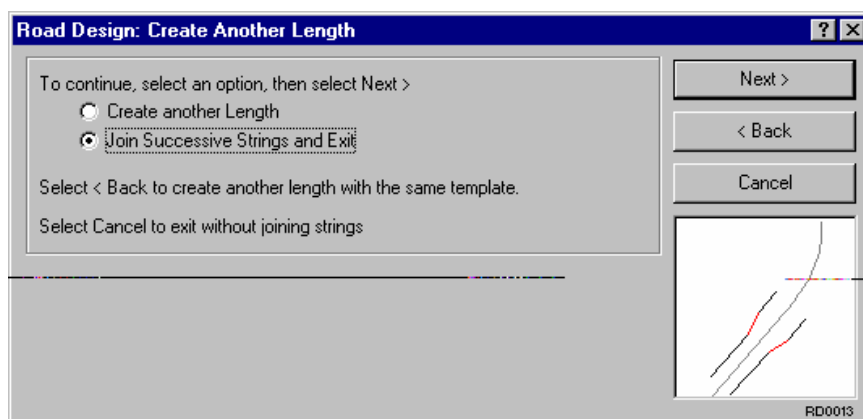
This panel will be displayed after the second and subsequent templates are applied to the roadway, prompting you to either ***Create Another Length*** of alignment with a different template, or to ***Join Successive Strings And Exit***.

In this example, we now have two different templates applied to our project with differing widths, and need to apply a transition to connect the two.

Select the ***Join Successive Strings option*** and Click ***Next***.
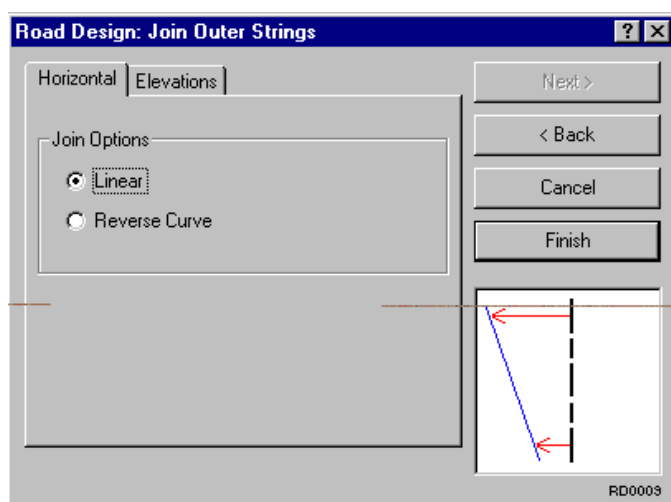
There are two tabs here that allow you to join successive strings Horizontally and Vertically either in a linear fashion, or by creating a reverse curve between them. Select one option on both tabs, then click Finish to create the transition (the default is linear.)

The gap between the edges of travelled way are now filled in:

Step 6: You'll now see this panel:

It's also important to note here that only a single feature string was created for each roadway edge for the entire length of the alignment.
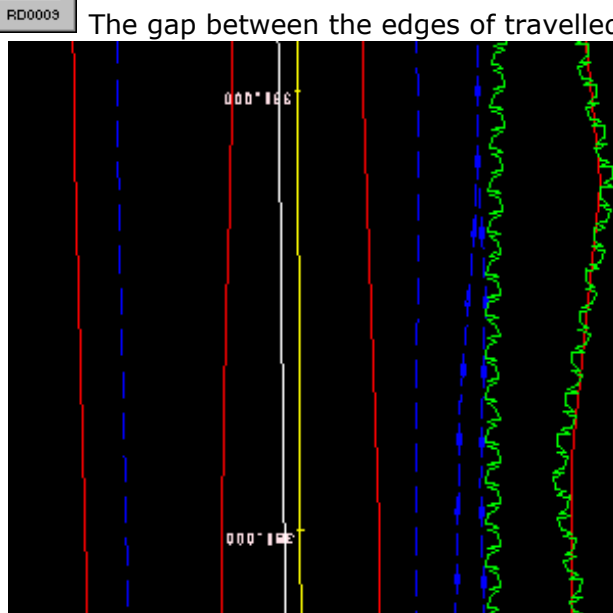
Create Template Strings using an INPUT File

We have two Master INPUT files designed to create template strings at MDOT:

CD-2L-RURAL-TEMP-MC10 - This file is set up to create a two-lane rural highway from edge of pavement to edge of pavement. It also contains the command lines to add superelevation for both a right and a left-hand curve and to adjust the shoulders as necessary.

CD-2L-URBAN-TEMP-MC10 - This file is set up to create a two-lane urban highway with curb, esplanade, and sidewalk strings if desired. It also contains the command lines to add superelevation for both a right and a left-hand curve and to adjust the shoulders as necessary.

Before editing these files, you should have an idea of what your template will look like, and the stationing limits where you would like to apply these Feature Strings. It is also necessary for you to have determined the stations where the beginning and end of each superlevation transition will occur, as well as the cross-slope of the travel lane at the point of maximum superelevation for each curve. The major advantage of using the INPUT file method for creating these feature strings is that later in the design process, if it is determined that additional sections are needed for quantities or driveways, these points can be inserted in to your M-String, and the template INPUT file run again to update all of your feature strings to reflect the new points added to the M-String.

Major Option DESIGN

To properly edit and utilize these Master INPUT files, a basic overview of the Minor Options available in Major Option DESIGN is necessary. Each of these options creates, amends, or extends a given string based on two of the following three criteria listed in the Minor Option Title:

"H" - Refers to Horizontal Offset from a Reference String, or Subsidiary String. A positive number creates the string to the right of the Reference or Subsidiary string, a negative number to the left.

"C" - Refers to a Cross Slope defined from a Reference String or Subsidiary String. A positive number creates the string to "uphill" from the reference or subsidiary string, a negative number, "downhill".

"V" - Refers to a Vertical Offset from a Reference String, or Subsidiary String. A positive number creates the string above the reference or subsidiary string, a negative number below it.

Anytime you see "Reference String" listed in the MOSS Quick Reference Guide, User Manual, or this training manual, it is normally referring to a 6D M-String. This allows the CHAIN Point Selection Menu choice to be valid when specifying the extents of the region along the M-String to which the option is being applied.

Anytime you see "Subsidiary String" listed, it is referring to a previously-created feature string from which you want to apply the H,C, or V criteria.

The following is a summary of the Minor Options available:

Minor Option 100, Add String: Constant H/Constant C

This minor option is used to create a feature string a constant horizontal offset from a Master Alignment String, or subsidiary string, at a constant cross-slope. It is used to create the majority of Highway Feature Strings for a particular roadway, specifically the edge of travelled way, edge of shoulder or gutterline. Esplanades, back of sidewalks, and berm hinges are also created using this option.

In the above drawing, the string CE16 is created a constant horizontal offset (H) 12.00 feet to the left of the Reference String MC10, at a constant cross-slope (C) of -0.02. The command line to create this string would look like this:

```
100,MC10,,CE16,-0.02,7=-12.0
```

The second string, ES16, is created at a constant horizontal offset (H) of 8.00 feet to the left of the Subsidiary String CE16, with Reference String MC10, at a constant cross-slope (C) of -0.04. The Command Line to create this string would look like this:

```
100,MC10,CE16,ES16,-0.04,7=-8.0
```

The field definitions for this command are:

*	Field 1	Reference string.
	Field 2	Subsidiary string (optional)
*	Field 3	New, extended or amended string.
	Field 4	Crossfall to be applied with respect to the subsidiary string (reference string by default). If zero is coded the resultant level of the new string will be the same as the subsidiary string; if the field is left blank the levels will be set to -999.
	Field 5 & 6	SPRD start.
*	Field 7	Constant horizontal offset to be applied.
	Field 8 & 9	SPRD end.

Minor Option 101, Add String: Linear H/Constant C

This minor option is used to create a string with different beginning and ending point offsets from a Reference or Subsidiary string, that maintains a constant cross slope from that Reference or Subsidiary string. An example of how this command is used is illustrated below:
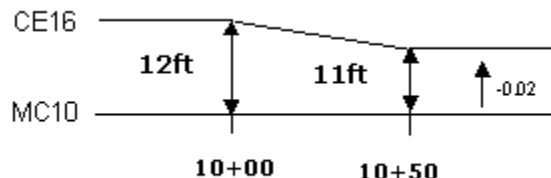
In the drawing above, the feature string CE16 transitions from a Horizontal Offset (H) of -12.0 at STA 10+00, to an offset of -11.0 at STA 10+50. The cross slope throughout this transition is -0.02. The command line to create this section of CE16 is:

```
101,MC10,,CE16,-0.02,1000.000,,-12.0,1050.000,,-11.0
```

The line above only creates the section of the string from STA 10+00 to 10+50. We can combine this line with two Minor Option 100's to completely define CE16 as shown in the drawing:

```
100,MC10,,CE16,-0.02,7=-12.0,1000.000
101,MC10,,CE16,-0.02,1000.000,,-12.0,1050.000,,-11.0
100,MC10,,CE16,-0.02,1050.000,7=-11.0
```

Please note that in the first line, only the ending station (10+00) is specified. Similarly, in the third line, only the beginning station limit (10+50) is specified. In this situation, MOSS assumes the first or last points on the Reference String as the value which was omitted.
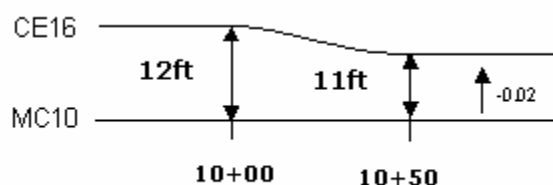
The field definitions for this command are:

* Field 1   Reference string.

   Field 2   Subsidiary string (optional)

* Field 3   New, extended or amended string.

   Field 4   Crossfall to be applied with respect to the subsidiary
                    string (reference string by default). If zero is coded the
                    resultant level of the new string will be the same as the
                    subsidiary string; if the field is left blank the levels
                    will be set to -999.

   Field 5 & 6   SPRD start.

* Field 7   Horizontal offset required at start point.

   Field 8 & 9   SPRD end.

* Field 10   Horizontal offset required at end point.

Minor Option 102; Add String: Reverse H/Constant C

This Minor Option is nearly identical to Minor Option 101, *Add String: Linear H/Constant C*, but will insert a reverse curve between the beginning and ending SPRD, where Minor Option 101 transitions in a linear fashion. Cross Slope from the Reference String or Subsidiary String to the string being created or amended is constant.
The following drawing illustrates this command:

In the drawing above, the feature string CE16 transitions from a Horizontal Offset(H) of -12.0 at STA 10+00, to an offset of -11.0 at STA 10+50 by inserting a Reverse Curve. The cross slope throughout this transition is -0.02. The command line to create this section of CE16 is:
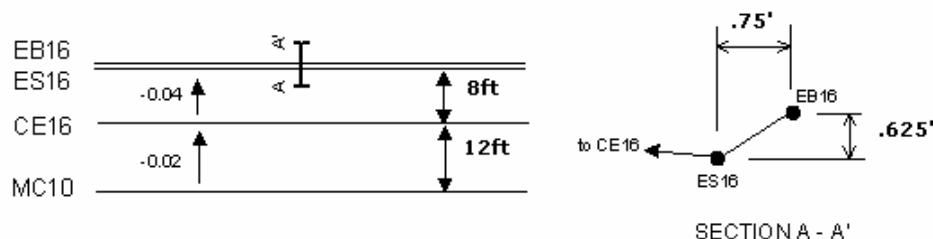
```
102,MC10,,CE16,-0.02,1000.000,,-12.0,1050.000,,-11.0
```

The field definitions for this command are:

* Field 1   Reference string.

  Field 2   Subsidiary string (optional)

* Field 3   New, extended or amended string.

  Field 4   Crossfall to be applied with respect to the subsidiary
                   string   (reference string by default). If zero is coded
                   the resultant level of the new string will be the same as
                   the subsidiary string; if the field is left blank the levels
                   will be set to -999.

  Field 5 & 6   SPRD start.

* Field 7   Horizontal offset required at start point.

  Field 8 & 9   SPRD end.

* Field 10   Horizontal offset required at end point.

Minor Option 110; Add String: Constant H / Constant V

This Minor Option is used to create a string at a constant Horizontal Offset and constant Vertical Offset from a Reference or Subsidiary String. This is the command used in the Master INPUT files to create a string representing the back of curb. The following drawing illustrates the command:

In the drawing above, the back of curb string, EB16, was created a constant Horizontal Offset of -0.016 m , and a constant Vertical Offset of 0.019 m from the Subsidiary String ES16, based on the Reference String MC10. The command line to create this string as depicted would be as follows:

```
100,MC10,ES16,EB16,0.625,7=-0.75
```

The field definitions for this command are:

```
* Field 1      Reference string.

  Field 2      Subsidiary string (optional)

* Field 3      New, extended or amended string.

  Field 4      Vertical offset to be applied with respect to the subsidiary string
               reference string by default).  If zero is coded the resultant level
               of the new string will be the same as the subsidiary string, if the
               field is blank the levels will be set to -999.0

  Field 5 & 6 SPRD start.

* Field 7      Constant horizontal offset to be applied.

  Field 8 & 9 SPRD end.
```

The use of this option is almost identical to option 100, the only difference being that a constant vertical offset is applied rather than a constant cross fall.

Creating Roadway Strings Using *Design A String*:

In the previous two sections, roadway strings were created using the MX Road - Roadway Wizard, and an INPUT file, which contains the basic command lines used by the wizard. A third way exists which is somewhere between these two methods, and that's using the **Design A String** function. This option enables you create each string individually, rather than as a group in the wizard. Each time you use this function, it produces one command line, which can be recorded in a JOURNAL file for later use in an INPUT file.

To use Design a String:

1.   Select **Design, Design A String, Horizontal Offset** from the Menu Bar:
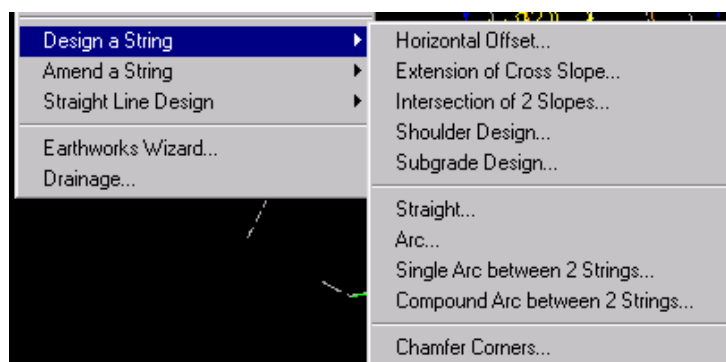
* Note: As you can see from the image above, a number of other options exist other than Horizontal Offset. Two of the options are particularly useful for your future reference, these are:

Intersection of 2 slopes: - is particularly useful for designing gore areas on interstate ramps, etc.

Single Arc between 2 strings: - This is the option used to create curb returns at intersections.

We won't be using these two options here, but I wanted to point them out. Additional information on these menu items are available in the Online Help Files.

2. The following Panel will appear. There are 4 tabs on this panel.

On the "Details" tab, the following information is needed.

Reference String - Your Master Alignment String (Roadway Centerline)

Subsidiary String - A string other than the Roadway Centerline that you want to base your horizontal and vertical offsets/cross slopes from. (i.e. When creating a shoulder string, the edge of travelway would be your subsidiary string.)

New String Name - When this is checked off, all you need to do is select the type of string which you want to create. In the example above, it's been indicated that we want to create an edge of shoulder string, which will begin with the characters "ES".

Notice that there is no place to type a new string label for the feature we are creating. That's because MX will automatically provide a string label based on the feature type we select.

On the "Horizontal Offset" tab, the following information is needed:

Select the type of Horizontal Offset

    Constant - for parallel strings
    Linear - for a straight taper
    Reverse Curve - for a reverse-curve taper

Select the Offset distance from the Reference String or Subsidiary string if one was chosen.

Select either the right or left arrow button next to the offset value to tell MX on which side of the Reference string you wish to create the new string.

Note: For Linear or Reverse Curve options, you need to provide a start and end offset.

On the "Elevations" tab, the following information is needed:

Select the type of vertical definition you want to use:

    No Elevations - All elevations will be null (-999)
    Constant Cross Slope - A percentage
    Constant Vertical Offset - (curbs, etc.)

Select the up or down arrow to determine the direction the elevations are to be applied relative to the Reference or Subsidiary string.

mdot mx

On the "Start and End" tab, the following information is needed:

Here you can select the start and end points of the zone on the Reference String that you want to create this new string along.

If both are left blank, the first and last points on the Reference string are used.

If the Start Point is left blank, the first point on the Reference String will be used.

If the End Point is left blank, the last point on the Reference String Will be used.

3. Click on **Apply** to create the string and keep the panel open to create another. Click on **OK** to create the string and dismiss the panel.

This page intentionally left blank